

REMARKS

Entry of the foregoing amendment, reconsideration and reexamination of the subject application, as amended, pursuant to and consistent with 37 C.F.R. §1.111, and in light of the remarks which follow, are respectfully requested.

By the foregoing amendment, claims 22, 28, 31-37 and 39-45 have been amended to recite "consisting of" language for the components of the suspension and the steps of the claimed methods. Other amendments to these claims are made for reasons of consistency and to address the Examiner's concerns noted in the Official Action issued November 29, 2001. Support for the amendment to claim 22 to recite the optional presence of an aluminum compound may be found in claim 30, and in the specification at least at page 11, lines 19-20. Support for the amendment to claims 31 and 39 to recite the optional addition of silica powder in step (B) may be found at least in claims 32 and 40. New claims 47 and 48 are added as being drawn to the aqueous suspension prepared according to the methods of claims 31 and 39, respectively. In addition, new claims 49-53 are directed to an aqueous suspension, and to methods for the preparation of an aqueous suspension, in which an electrolyte is not added. Support for this feature may be found in the specification at least at page 5, lines 10-13.

Claims 32-37 stand rejected under 35 U.S.C. §112, second paragraph, as being indefinite. Applicants respectfully traverse these rejections for at least the following reasons.

By the foregoing amendments, the claims have been amended to recite "consisting of" rather than "consisting essentially of". In addition, claims 32-37 have been amended to remove the recitation of "comprising". Applicants submit that the present claim language is not allegedly confusing since both of the terms "consisting of" and "comprising" are not used. The present claims language is therefore clear within the meaning of the second paragraph.

Withdrawal of the second paragraph rejections is requested.

Claims 22-37 and 39-45 stand rejected under 35 U.S.C. §103(a) as being allegedly obvious over Chevallier et al (U.S. Patent No. 5,403,570). In addition, claims 38 and 46 stand rejected under 35 U.S.C. §103(a) as being allegedly obvious over Chevallier et al (U.S. Patent No. 5,403,570) as applied against claims 22-37 and 39-45 in the preceding rejection, and further in view of Cox et al (U.S. Patent No. 4,837,195).

Applicants respectfully traverse these rejections for reasons noted in their previous responses (incorporated herein) and for at least the following reasons.

The present invention relates to an aqueous silica suspension and a method of making the suspension having specific characteristics. As amended, independent claim 22 recites an aqueous suspension consisting of precipitated silica, water and, optionally, an aluminum compound, having a solids content between 10 and 40% by weight solids, a viscosity lower than 4×10^{-2} Pa.s at a shear rate of 50 s^{-1} and a stability such that the amount of silica in the supernatant obtained after centrifuging said suspension at 7500 revolutions per minute for 30 minutes represents more than 50% of the weight of the silica initially present in the suspension. Independent claims 31 and 39 further relate to methods of making the claimed suspension consisting of the recited steps (A), (B) and (C).

Chevallier et al relates to dispersible precipitated silica particulates and a process for their preparation, including the steps of:

(a) providing an initial sediment or vessel bottoms which comprises at least a portion of the total amount of silicate required for the reaction and an electrolyte, the concentration of silica in said initial sediment being less than 100 g/l and the concentration of electrolyte in said initial sediment being less than 17 g/l;

(b) adding the acidifying or acid agent to said sediment until the pH of the reaction medium has attained a value of at least about 7;

(c) adding additional acidifying agent to the reaction medium and, if appropriate, the remainder of the silicate simultaneously, whereby a suspension is produced in which the maximum proportion of dry solids is 24% by weight; and

(d) drying the suspension thus produced.

Chevallier et al further discloses that the resulting cake is then subjected to a known disintegration operation such as transferring the cake into a colloidal or ball-type mill (column 4, lines 57-65). The final product produced is a silica powder, preferably having a mean particle size of from 5-70 microns (column 4, line 66 et seq) which is suitable for use in reinforcing elastomer/rubber matrices.

Cox et al relates to a process for porosity control and rehydroxylations of silica bodies by contacting the bodies with an effective amount of ammonium bifluoride. Following the disclosed chemical treatment with ammonium bifluoride, the treated silica may be washed with water or other solvents.

In the Official Action issued November 29, 2001, it is asserted that additional components and method steps present in the suspension and method of making the suspension of Chevallier et al are not excluded from Applicants' claims.

By the foregoing amendments, independent claims 22, 31 and 39 have been amended to recite "consisting of" language such that additional components (except for the presence of impurities) and method steps are excluded. See, e.g., MPEP §2111.03, quoting *In re Gray*, 53 F.2d 520, 11 USPQ 255 (CCPA 1931); *Ex parte Davis*, 80 USPQ 448, 450 (Bd. App. 1948) ("consisting of" defined as "closing the claim to the inclusion of materials other than those recited except for impurities ordinarily associated therewith."). By comparison, Chevalier et al includes additional components and steps that are not recited in Applicants' claims.

For example, Chevalier et al states that an electrolyte is present or is added in a method step. See, e.g., column 2, line 37-40, column 3, lines 22-24, and the examples wherein sodium

sulfate is utilized as the electrolyte (e.g., Example 1, column 13, line 18). Applicants' independent claims 22 and 31 do not recite the presence of or the addition of an electrolyte.

As well, Chevallier et al utilizes additional method steps other than method steps (A), (B) and (C) according to Applicants' claims. In particular, after step (c) of Chevallier et al (*i.e.*, adding additional acidifying agent to the reaction medium and, if appropriate, the remainder of the silicate simultaneously), the recovery of the precipitated silica as a filter cake (column 4, lines 15-23), followed by subjecting the cake to "a known disintegrating operation". Such an additional disintegrating step "may comprise transferring the cake into a colloidal or ball-type mill" so that the silica may then be spray dried to produce the final silica powder (see especially column 4, lines 57-59 and 53-56). By comparison, Applicants' claims do not include a disintegrating operation.

Further, Chevallier et al utilizes the disintegration step to put the filter cake "in a condition which would permit it to be sprayed" (column 4, lines 53-55). Chevallier et al does not appear to indicate that the disintegration step is optional, nor is there any apparent reason to exclude such a step.

As noted in Applicants' previous responses, the present claims are also not *prima facie* obvious over Chevallier et al at least for the reason that each and every feature of the claims is not disclosed or suggested. For example, the claims include the feature wherein the aqueous silica suspension has a solids content between 10 and 40% by weight, a viscosity lower than 4×10^{-2} Pa.s at a shear rate of 50 s^{-1} and a stability such that the amount of silica in the supernatant obtained after centrifuging said suspension at 7500 revolutions per minute for 30 minutes represents more than 50% of the weight of the silica initially present in the suspension. This feature is not at all disclosed or suggested by Chevallier et al. As has also been previously explained, there is furthermore no basis to conclude that the same suspension characteristics claimed by Applicants are necessarily inherent in the process of Chevallier et al.

Cox et al furthermore fails to remedy the deficiencies noted above for Chevallier et al at least for the reason that there is nothing in this document to suggest the exclusion of an electrolyte or a disintegration step from the suspension and method of Chevallier et al.

Based at least upon the foregoing, the present claims are patentable over Chevallier et al. Withdrawal of the rejection of claims 22-46 based on Chevallier et al, and the combination with Cox et al, is respectfully requested.

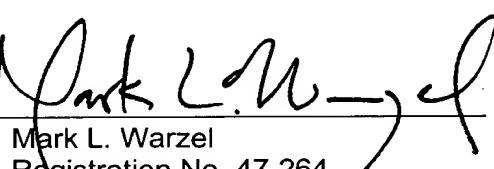
New claims 47-53 are also patentable over Chevallier et al and the combination with Cox et al since the suspensions and methods recited in these claims are not disclosed or suggested. More particularly, these new claims exclude Chevallier et al's distintegration step and/or the electrolyte present in the suspension of Chevallier et al.

From the foregoing, further and favorable action in the form of a Notice of Allowance is believed to be next in order, and such action is earnestly solicited.

The Examiner is respectfully requested to contact the undersigned If there are any questions concerning the foregoing amendments and remarks.

Respectfully submitted,
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Marked-up Version of Claims 22, 28, 31-37 and 39-45**

22. (three times amended) An aqueous suspension consisting [essentially] of precipitated silica, water and, optionally, an aluminum compound, said suspension having a solids content between 10 and 40% by weight, a viscosity lower than 4×10^{-2} Pa.s at a shear rate of 50 s^{-1} and wherein the amount of silica present in the supernatant obtained after centrifuging said suspension at 7500 revolutions per minute for 30 minutes represents more than 50 % of the weight of the silica present in the suspension.

28. (amended) An aqueous suspension according to Claim 22, wherein the particle size distribution of the agglomerates in suspension is such that their median diameter [D50] D_{50} is smaller than $5 \mu\text{m}$ and the deagglomeration factor [FD] E_D is greater than 3 ml.

31. (five times amended) A method for the preparation of an aqueous suspension of precipitated silica, having a solids content between 10 and 40% by weight, a viscosity lower than 4×10^{-2} Pa.s at a shear rate of 50 s^{-1} and wherein the amount of silica present in the supernatant obtained after centrifuging said suspension at 7500 revolutions per minute for 30 minutes represents more than 50% of the weight of the silica present in the suspension, consisting [essentially] of the steps of:

(A) precipitating silica by reacting an acidifying agent with an alkali metal (M) silicate, by:

(i) providing an initial base stock [, comprising] of a proportion of the total amount of the alkali metal silicate introduced into the reaction, the silicate concentration expressed as SiO_2 in said base stock being lower than 20 g/l,

(ii) adding said acidifying agent to said initial base stock until at least 5 % of the amount of M_2O present in said initial base stock is neutralized,

(iii) adding said acidifying agent to the reaction mixture simultaneously with the remaining amount of alkali metal silicate such that the ratio (amount of silica added)/(amount of silica present in the initial base stock) is between 10 and 100;

(B) separating from the reaction mixture a precipitation cake which has a solids content of between 10 and 40%, and, optionally, adding to said precipitation cake, an amount of silica powder such that the solids content of the silica-enriched cake is between 10 and 40%; and

(C) deagglomerating [the] said cake to obtain a suspension of low viscosity and wherein said deagglomerating is conducted under conditions that result in a silica suspension which has a stability such that the amount of silica in the supernatant obtained after centrifuging said

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suspension at 7500 revolutions per minute for 30 minutes represents more than 50% of the weight of the silica initially present in the suspension.

32. (amended) A method according to Claim 31, [comprising] wherein, after step (B), [the addition to the said precipitation cake, of] an amount of silica powder is added to said precipitation cake, such that the solids content of the silica-enriched cake is between 10 and 40%.

33. (amended) A method according to Claim 31, [comprising,] wherein, in step (C), the dilution of [the] said precipitation cake is performed with water.

34. (amended) A method according to Claim 31, [comprising,] wherein, in step (C), [the] mechanical crumbling of said precipitation cake is performed by a wet grinding process or by an ultrasonic treatment.

35. (amended) A method according to Claim 31, [comprising,] wherein, in step (C), a chemical crumbling is performed simultaneously with a mechanical crumbling, [the] said chemical crumbling being carried out by acidifying the silica suspension to a pH lower than 4.

36. (amended) A method according to Claim 31, [comprising,] wherein, in step (C), a chemical crumbling is performed conjointly with a mechanical crumbling, said chemical crumbling being carried out by introducing sulphuric acid and sodium aluminate simultaneously so that the pH of the suspension remains between 6 and 7 and the Al/SiO₂ weight ratio is between 1000 and 3300 ppm.

37. (amended) A method according to Claim 31, [comprising,] wherein, in step A (iii), [the addition to the reaction mixture of simultaneously] sulphuric acid and sodium aluminate are simultaneously added to the reaction mixture, so that the pH of the mixture remains between 6 and 7 and the Al/SiO₂ weight ratio is between 1000 and 3300 ppm, before proceeding to step (B).

39. (four times amended) A method for the preparation of an aqueous suspension of precipitated silica, having solids content of between 10 and 40% by weight, which viscosity is lower than 4×10^{-2} Pa.s at a shear rate of 50 s⁻¹ and wherein the amount of silica present in the supernatant obtained after centrifuging the said suspension at 7500 revolutions per minute for

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30 minutes represents more than 50 % of the weight of the silica present in the suspension, [comprising] consisting of the steps of:

(A) precipitating silica by reacting an acidifying agent with an alkali metal (M) silicate, by:

(i) providing an initial base stock [, comprising] of at least a proportion of the total amount of the alkali metal silicate to be introduced into the reaction, and an electrolyte, the silicate concentration, expressed as SiO₂ in the said initial base stock being lower than 100 g/l and the electrolyte concentration in the said initial base stock being lower than 17 g/l;

(ii) adding the acidifying agent to said base stock until a pH value of the reaction mixture of at least approximately 7 is obtained;

(iii) when only a proportion of the silicate is provided by the initial base stock, adding simultaneously the acidifying and the remaining amount of the silicate to the reaction mixture;

(B) separating from the reaction mixture a precipitation cake which has a solids content of between 10 and 40%, and, optionally, adding to said precipitation cake, an amount of silica powder such that the solids content of the silica-enriched cake is between 10 and 40%; and

(C) deagglomerating said cake to obtain a suspension of agglomerates having a median diameter D₅₀ smaller than 5 µm, whereby a suspension of low viscosity is provided and wherein said deagglomerating is conducted under conditions that result in a silica suspension which possesses a stability such that the amount of silica in the supernatant obtained after centrifuging said suspension at 7500 revolutions per minute for 30 minutes represents more than 50% of the weight of the silica initially present in the suspension.

40. (amended) A method according to Claim 39, [comprising] wherein, after step (B), [the addition of] an amount of silica powder is added to [the] said precipitation cake, such that the solids content of the silica-enriched cake is between 10 and 40%.

41. (amended) A method according to Claim 39, [comprising,] wherein, in step (C), the dilution of said precipitation cake is performed with water.

42. (amended) A method according to Claim 39, [comprising,] wherein, in step (C), [the] mechanical crumbling of said precipitation cake is performed by a wet grinding process or by an ultrasonic treatment.

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43. (amended) A method according to Claim 39, [comprising,] wherein, in step (C), a chemical crumbling simultaneously is performed simultaneously with a mechanical crumbling, [the] said chemical crumbling being carried out by acidifying the silica suspension to a pH lower than 4.

44. (amended) A method according to Claim 39, [comprising,] wherein, in step (C), a chemical crumbling is performed conjointly with a mechanical crumbling, said chemical crumbling being carried out by introducing sulphuric acid and sodium aluminate simultaneously so that the pH of the suspension remains between 6 and 7 and the Al/SiO₂ weight ratio is between 1000 and 3300 ppm.

45. (amended) A method according to Claim 39, [comprising,] wherein, in step A (iii), [the addition to the reaction mixture of simultaneously] sulphuric acid and sodium aluminate are simultaneously added to the reaction mixture, so that the pH of the mixture remains between 6 and 7 and the Al/SiO₂ weight ratio is between 1000 and 3300 ppm, before proceeding to step (B).